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The Effect of Planar Magnetic Inhomogeneities on the Critical Temperature of Ferromagnet–Superconductor Systems

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Abstract

© 2016, Springer Science+Business Media New York.We study superconducting systems with the inhomogeneous effective exchange field background. A model of magnetic superconductor which takes into account the collectivized electrons interaction with the inhomogeneous effective exchange field is used. With local unitary rotation in spinor space we rewrite the Hamiltonian in a new basis where this interaction is diagonal. The problem is reduced to the one with a uniform exchange field but the effective tensor field appears. This method allows us to simplify the Gor'kov, Eilenberger, and Usadel equations in many symmetric cases. We calculate the critical temperature of the superconductor/ferromagnet proximity system in the dirty limit where the ferromagnet has periodic domain structure with planar domain walls.

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Keywords

Ferromagnetic domain, Proximity effect, Superconductivity